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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/672,475	09/25/2003	Pete I. Klimecky	LAM-P1062	8237

49713 7590 09/12/2005

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EXAMINER

DHINGRA, RAKESH KUMAR

ART UNIT PAPER NUMBER

1763

DATE MAILED: 09/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/672,475

Applicant(s)

KLIMECKY ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 9/25/03.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-10, 13 and 14 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) 1-15 are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-10, 13, 14, drawn to apparatus, classified in class 156, subclass 345.44.
- II. Claims 11, 12, drawn to method, classified in class 438, subclass 513.
- III. Claim 15, drawn to product, classified in class 428, subclass 846.6.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as apparatus and method for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case for example the apparatus has a second power circuit with a matching network coupled to work piece holder and thus can be used for practicing a process which requires close control of bias power.

Inventions I and III are related as apparatus and product made. The inventions in this relationship are distinct if either or both of the following can be shown: (1) that the apparatus as claimed is not an obvious apparatus for making the product and the apparatus can be used for making a different product or (2) that the product as claimed can be made by another and materially different apparatus (MPEP § 806.05(g)). In this case for example the apparatus has a second power circuit with a matching network

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coupled to work piece holder and thus can be used for making a different product which requires close control of bias power.

Inventions II and III are related as process of making and product made. The inventions are distinct if either or both of the following can be shown: (1) that the process as claimed can be used to make other and materially different product or (2) that the product as claimed can be made by another and materially different process (MPEP § 806.05(f)). In the instant case the method requires an RF probe in a side wall of the chamber whereas the product does not require any such configuration of the RF probe and thus the product can be made by a different process without installing the RF probe in the wall of the chamber.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Groups II, III and so on, restriction for examination purposes as indicated is proper.

During a telephone conversation with S. Bhattacharya on 8/22/05 a provisional election was made without traverse to prosecute the invention of Group I, claims 1-10, 13, 14.

Affirmation of this election must be made by applicant in replying to this Office action.

Claims 11, 12, 15 are withdrawn from further consideration by the examiner, 37

CFR 1.142(b), as being drawn to a non-elected invention.

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Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

***Specification***

The disclosure is objected to because of the following informalities:

Paragraph 0023, line 4: it is suggested to replace "204" with "222".

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

**Claims 1-4, 13, 14 are rejected under 35 U.S.C. 102(b) as being anticipated by Sugai et al (US Patent No. 6,184,623).**

Regarding Claim 1: Sugai et al teach a plasma apparatus (Figures 1, 2) comprising: a board (work piece holder) for holding work piece W within a chamber 1 (Column 7, lines 30-32);

a power circuit 8 arranged to supply RF power to the chamber suitable for striking a plasma PM within the chamber, and

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a high frequency power control section 9 (includes feedback) coupled to said power circuit, and a probe control section 11 including a RF 12 probe partially disposed in an interior of the chamber 1, said RF probe measuring a change in plasma density, said high frequency power control section 9 adjusting RF power in response to said change in plasma density (Column 7, lines 54-60 and Column 8, lines 1-36 and Column 12, lines 1-7).

Regarding Claim 2: Sugai et al teach that power circuit includes a power supply 8 coupled to a matching network 10a, said matching network coupled to a coil adjacent to the chamber (Column 7, lines 45-50).

Regarding Claim 3: Sugai et al teach a probe control section 13 (network analyzer), which is coupled to, said RF probe 12 comprising of;

a plasma absorption frequency obtaining section 22 (part of computer) that obtains and compares a plurality of reflection coefficients of the RF power generated by said RF probe 12 over a spectrum of frequencies and calculates the plasma density;

wherein matching device control section 10c (part of computer) applies variation in plasma density to the impedance matching device 10a (Column 8, lines 30-35 and Column 9, line 24 through Column 10, line 31 and Column 11, line 56 through Column 12, line 20).

Regarding Claim 4: Sugai et al teach that the RF probe 12 includes an antenna 15 (Figure 2) surrounded by quartz tube 14 (Column 8, lines 36-47).

Regarding Claim 13: Sugai et al teach that the apparatus has a high frequency oscillator 18 (means for generating an RF signal in an interior of the chamber);

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plasma absorption frequency obtaining section 22 (means for measuring a change in a reflection coefficient of said RF signal over a spectrum of frequencies); and matching device control section 10c (means for adjusting a power supply configured to strike a plasma within the chamber based on said change) [Column 9, line 24 through Column 10, line 31].

Regarding Claim 14: Sugai et al teach all limitations of claim as explained above.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 5–10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sugai et al (US Patent No. 6,184,623) in view of admitted prior art.**

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Regarding Claims 5: Sugai et al teach all limitations of the claim (as explained above) except a second power circuit coupled to a second matching network and to work piece holder.

Admitted prior art teaches an apparatus (Figure 1) that has a second power circuit having a second power supply 112 coupled to a second matching network 120; said second matching network 120 coupled to work piece holder 122.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use a second power supply with matching circuit and coupled to work piece holder as taught by admitted prior art in the apparatus of Sugai et al to apply bias power to the substrate.

Regarding Claim 6: Sugai et al teach that the RF probe 12 includes an antenna 15 (Figure 2) surrounded by quartz tube 14 (Column 8, lines 36-47).

Regarding Claim 7: Sugai et al teach all limitations of the claim as explained above (Column 9, line 37 through Column 10, line 31).

Regarding Claims 8, 9: Sugai et al teach that the probe control section 13 (network analyzer) includes a high frequency oscillator (third power supply) 18 coupled to measuring probe 12 and that generates high frequency power for measuring plasma density information (Column 9, lines 24 – 50).

Regarding Claim 10: Sugai et al teach that the plasma absorption frequency obtaining section 22 (network analyzer) measures a plurality of reflection coefficients of said HF signal over a spectrum of frequencies, a change in said plurality of reflection coefficients

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of said absorbed HF signal representative of a change in plasma density (Column 9, line 66 through Column 10, line 26).

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

**Patrick et al (US Patent No. 6,174,450)** teach an inductively coupled plasma apparatus 30" (Figure 4b) that has a feedback circuit 102 coupled with power supply 36 and matching network 46 and where the feedback circuit controls the level of plasma density in the plasma chamber 33.

**Ohmi et al (US Patent No. 5,444,259)** teach a plasma processing apparatus (Figure 1) that has mechanisms 12 (RF oscillator), 13 (computer measurement system), 14 (control system) for measuring, calculating, storing and controlling ion energy and plasma density to preset values.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rakesh Dhingra



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